

**REMARKS**

Examiner M. Guerrero is thanked for the thorough examination and search of the subject Patent Application. Claims 1, 4, 6, 10, 14, and 17 have been amended, Claims 13 and 20-25 have been canceled, and new claims 26 and 27 have been added. No new matter has been added.

The making final of the restriction requirement is noted. Non-elected claims 20-25 are hereby canceled. Applicants reserve the right to file a Divisional Patent Application to the non-elected claims once the elected claims are allowed.

Claims 4, 10, and 17 have been amended to overcome objections for informalities. The percentage indicated is an atomic percent. This has been made clear in the claims. Although the Specification does not explicitly state that the percentage is an atomic percent, it is implicit as the atomic percent is known to be used in this context. The cited references disclose atomic percent when they refer to carbon content. See, for example, Takahashi col. 6, lines 10-11.

All Claims are believed to be in condition for Allowance, and that is so requested.

Reconsideration of the rejection under 35 U.S.C. 102 of Claim 1 as being anticipated by Puchner is requested in view of Amended Claim 1 and in accordance with the following remarks.

Claim 1 has been amended to include the fabrication of an integrated circuit device, as in Claims 6 and 14. The strained silicon carbide layer of Puchner overlying the source and drain

regions has nothing to do with the carbon-doped layer of Applicants' invention underlying the halo regions.

Reconsideration of the rejection under 35 U.S.C. 102 of Claim 1 as being anticipated by Puchner is requested in view of Amended Claim 1 and in accordance with the remarks above.

Reconsideration of the rejection under 35 U.S.C. 102 of Claims 1 and 6 as being anticipated by Babcock et al is requested in view of Amended Claims 1 and 6 and in accordance with the following remarks.

It is agreed that Babcock et al forms LDD and source and drain regions adjacent to the gate electrode. Claims 1 and 6 have been amended to make it clear that the LDD and source and drain regions are implanted within the epitaxial silicon layer, as shown in Fig. 3 and described on pages 9-10 of the Specification. Babcock et al forms halo implants in an alternative embodiment of their invention, described in paragraph 0017 and shown in Figs. 4a and 4b. In this embodiment, the carbon-doped layer is not deposited on silicon followed by the growth of an epitaxial silicon layer. In this embodiment, the carbon-doped layer is implanted under the gate structure followed by halo implantation, resulting in the carbon-doped layer's encapsulating the halo implant. Thus, Babcock et al does not teach depositing a carbon-doped layer on a silicon substrate, growing an epitaxial silicon layer over the carbon-doped layer, and forming halo implants in the epitaxial silicon layer where the halo implants extend to an interface between the epitaxial silicon layer and the carbon-doped layer, as now claimed in Claims 1 and 6.

Reconsideration of the rejection under 35 U.S.C. 102 of Claims 1 and 6 as being anticipated by Babcock et al is requested in view of Amended Claims 1 and 6 and in accordance with the remarks above.

Reconsideration of the rejection under 35 U.S.C. 102 of Claims 1-4 as being anticipated by Yeo et al is requested in view of Amended Claim 1 and in accordance with the following remarks.

Claim 1 has been amended to include the fabrication of an integrated circuit device, as in Claims 6 and 14. The silicon-germanium-carbon layer of Yeo et al underlying the gate has nothing to do with the carbon-doped layer of Applicants' invention underlying the halo regions.

Reconsideration of the rejection under 35 U.S.C. 102 of Claims 1-4 as being anticipated by Yeo et al is requested in view of Amended Claim 1 and in accordance with the remarks above.

Reconsideration of the rejection under 35 U.S.C. 102 of Claims 1, 3, 5-7, 9, 11-14, 16, and 18-19 as being anticipated by Mansoori et al is requested in view of Amended Claims 1, 6, and 14 and in accordance with the following remarks.

The claims have been amended to make it clear that the halo implants 30 are implanted into the epitaxial silicon layer 14, as shown in Fig. 3. It is critical that the carbon-doped layer 12 lies at the silicon interface of the halo doping profile (page 9) to prevent end-of-range secondary

defects associated with the halo implant. In Applicants' invention, the carbon-doped layer is intentionally directed away from the transistor channel region. This is to avoid undesirable electrical effects which may result from the presence of carbon in the transistor channel. Due to processing and fundamental concerns, carbon may exist in the form of interstitials in silicon and this degrades the drive current of the transistor when located nearer to the channel region.

Another purpose of partially overlapping the implant profile is in order to conserve the usual dopant activation scheme. This is to simplify the fabrication of the transistor such that the dopant activation kinetics in silicon, which has been well understood, may be applicable. Mansoori's halo implants 152 (Fig. 15) are implanted within the carbon-doped layer 104, not within the epitaxial silicon layer 108. Thus, the location of the carbon-doped layer beginning at the end-of-range of the halo implant doping profile is not taught by Mansoori et al.

Reconsideration of the rejection under 35 U.S.C. 102 of Claims 1, 3, 5-7, 9, 11-14, 16, and 18-19 as being anticipated by Mansoori et al is requested in view of Amended Claims 1, 6, and 14 and in accordance with the remarks above.

Reconsideration of the rejection under 35 U.S.C. 103 of Claims 2, 8, 10, 15, and 17 as being unpatentable over Mansoori et al in view of Takahashi is requested in view of Amended Claims 1, 6, and 14 and in accordance with the following remarks.

Takahashi shows depositing a carbon-containing polycrystalline layer. However, this layer is used to prevent thermal diffusion "solely on the polycrystalline silicon layer 22"

underlying the carbon-containing layer 24 (col. 5, lines 62-67). The carbon-containing layer 24 becomes part of a gate electrode as shown in Fig. 3. This has nothing to do with Applicants' invention or with Mansoori et al. There would be no motivation to combine Takahashi with Mansoori et al. Thus, Applicants' invention is not taught or suggested by the combination of references.

Reconsideration of the rejection under 35 U.S.C. 103 of Claims 2, 8, 10, 15, and 17 as being unpatentable over Mansoori et al in view of Takahashi is requested in view of Amended Claims 1, 6, and 14 and in accordance with the remarks above.

Allowance of all Claims is requested.

It is requested that should Examiner Guerrero not find that the Claims are now Allowable that the Examiner call the undersigned at 765 4530866 to overcome any problems preventing allowance.

Respectfully submitted,

  
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